

*21st Century
Approaches to CSO &
Water Quality Restoration*

Paul L. Freedman, P.E., BCEE



Wet Weather Partnership & NACWA

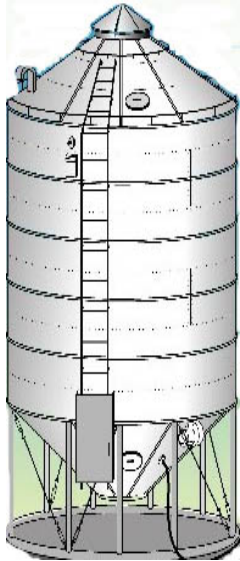
April 26-27, 2007

Burning Cuyahoga

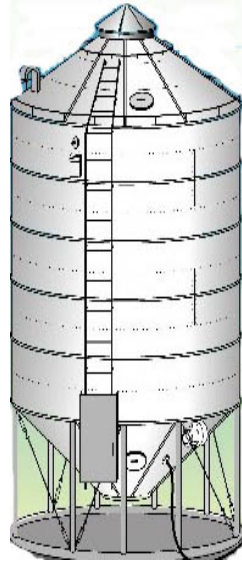


Traditional CWA Approach to Water Quality Protection, "Silos"

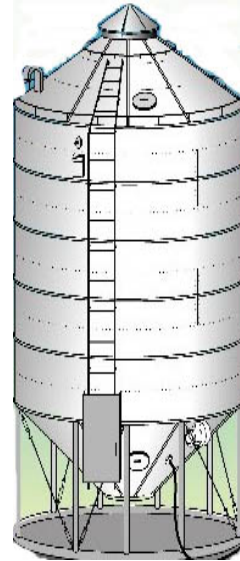
Sewage



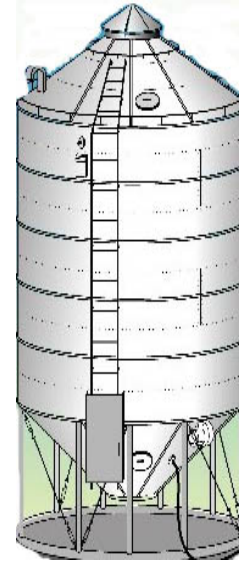
Industrial waste



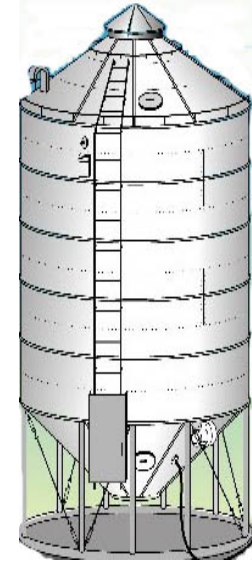
CSO



SSO

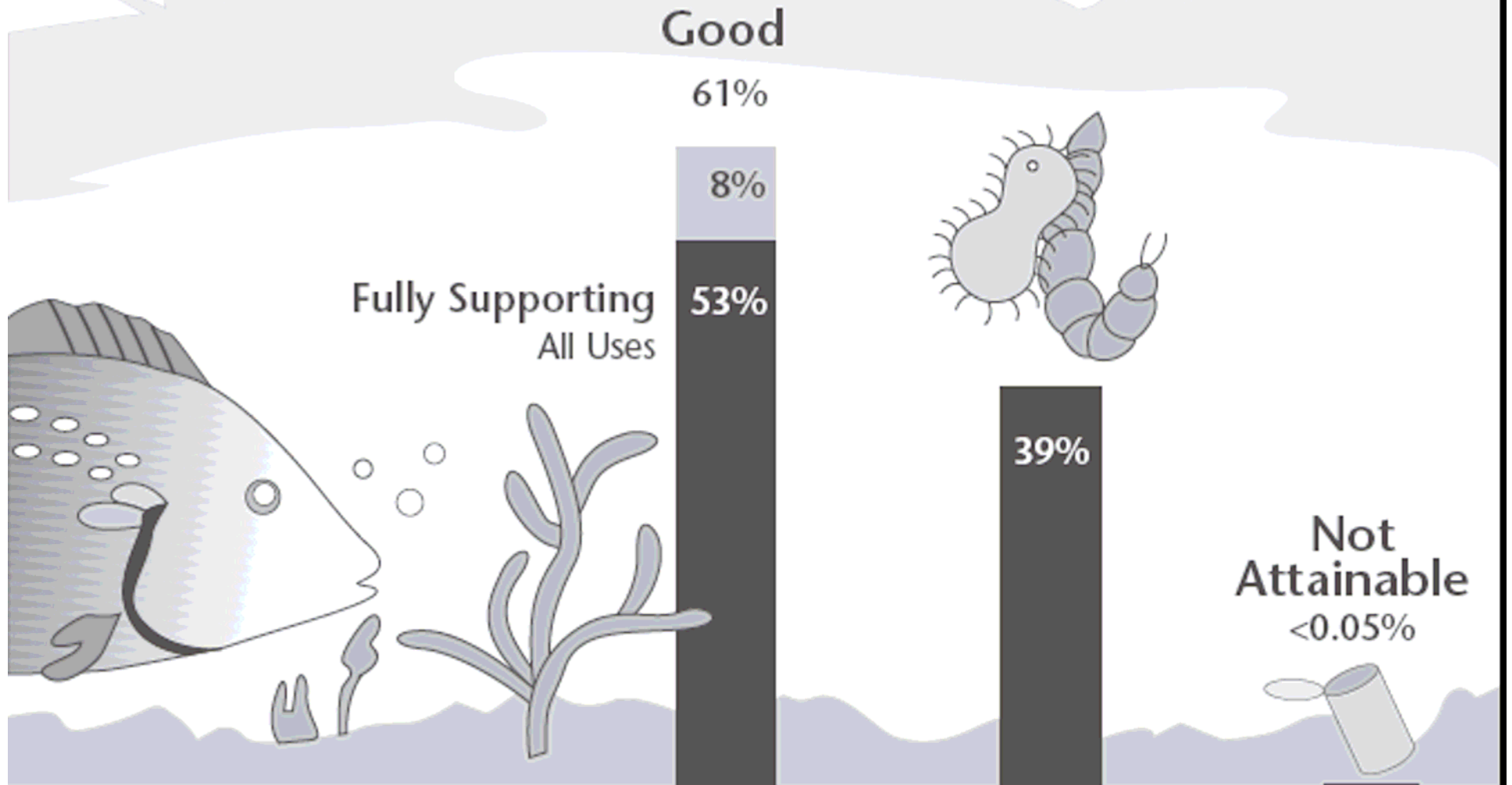


Storm Water

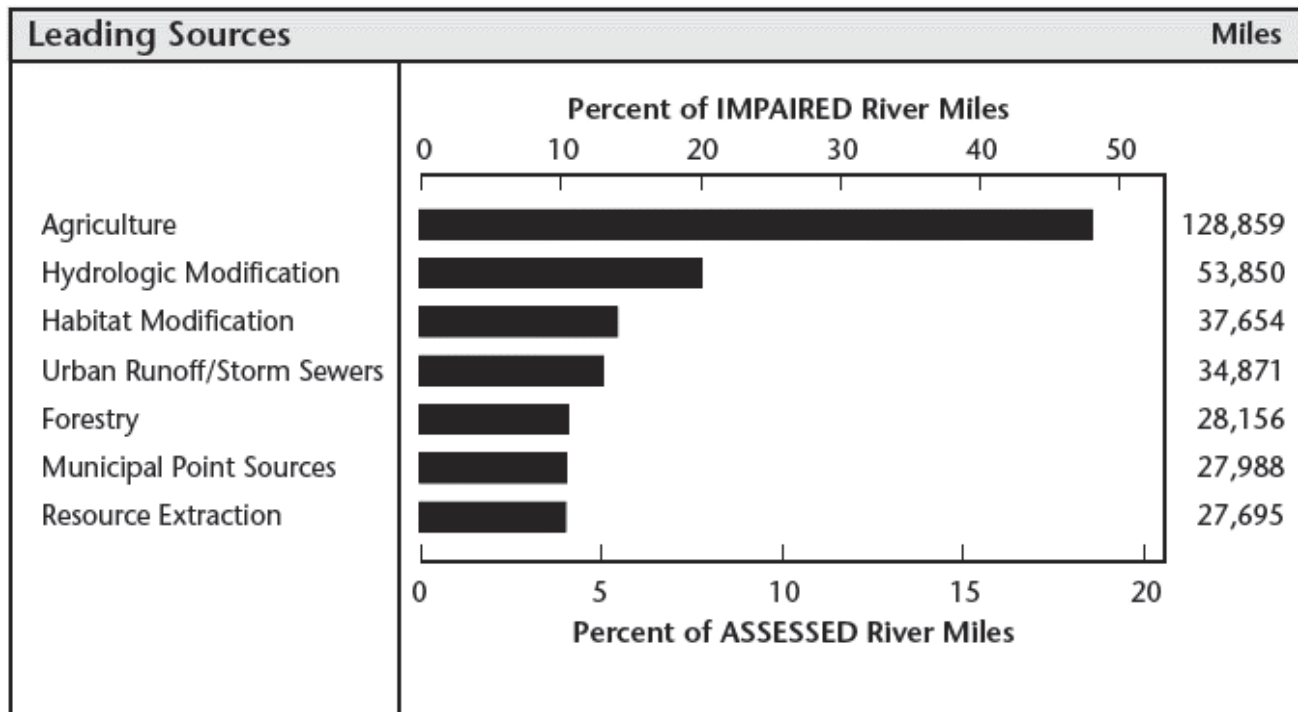


Assessed Rivers and Streams

Supporting Uses (EPA 841-R-02-001)

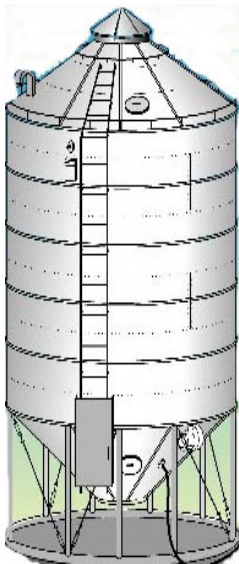


Leading Sources (EPA 841-R-02-001)



Clean Water Watershed Regulation

NPDES



Agriculture

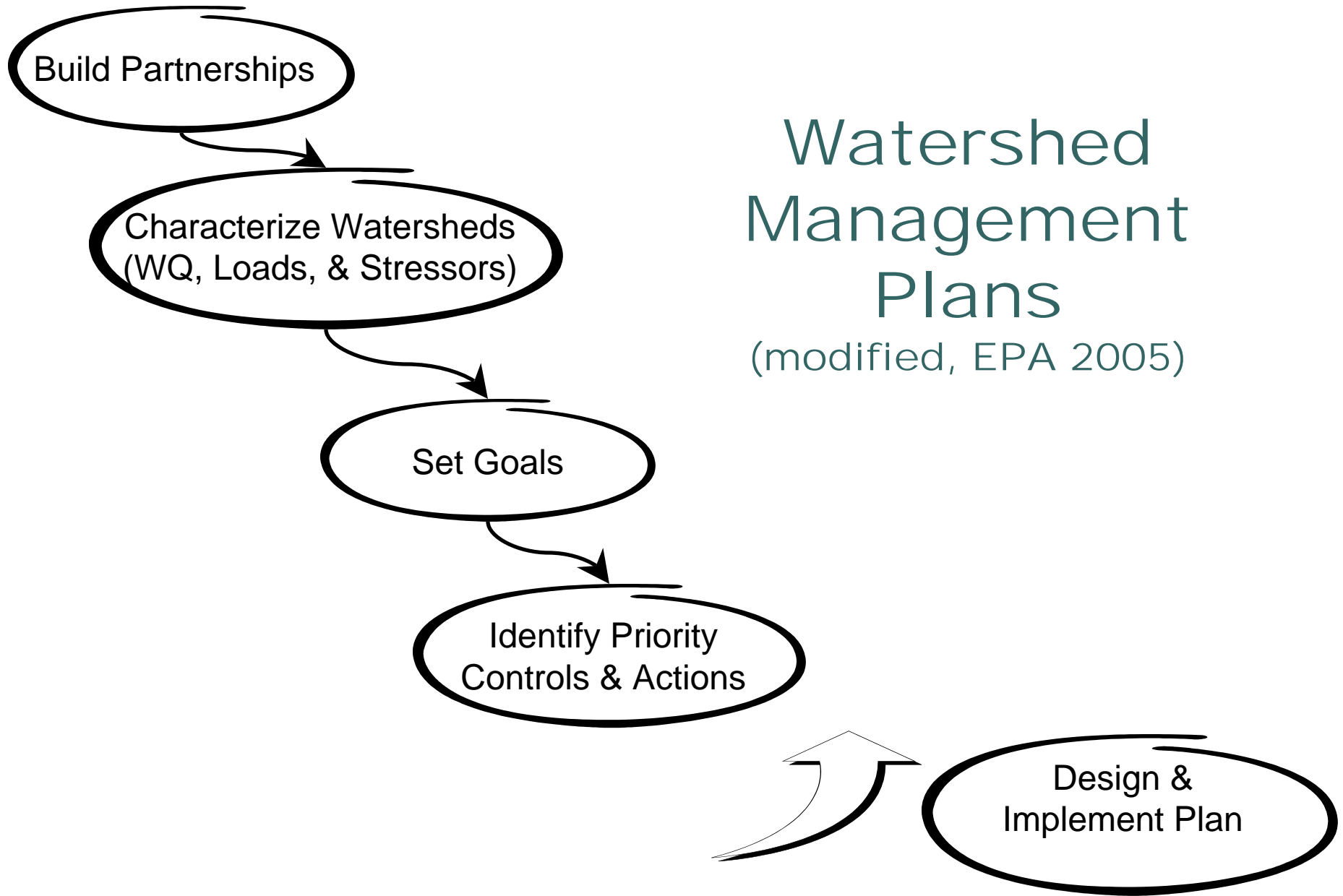


**Natural
Habitat**

Flow

21st Century Approaches to Water Quality Protection

- Watershed Management
- Adaptive Management
- Use Attainability Analysis (UAA)



Watershed Management Plans

(modified, EPA 2005)

Build Partnerships

Characterize Watersheds
(WQ, Loads, & Stressors)

Set Goals

Identify Priority
Controls & Actions

Design &
Implement Plan

Attributes of Watershed Management

- Stakeholder input
- Examine all loads & stressors
- Holistic assessment problems & solutions
- Focus on priorities, not programs
- Integrate with TMDLs

Experts & EPA Promote Watershed Management

- **NAS/NRC: SW Pennsylvania – wet weather**
 - Required comprehensive watershed-based approach
- **EPA Watershed Management Handbook**
 - Most technically sound and economically efficient
- **EPA 4 Pillars of Sustainable Infrastructure**
 - 4. Watershed approaches to protection

EPA Regulators Support Watershed Management

EPA Permit Writers Manual

- EPA's renewed emphasis to address all stressors within a drainage basin instead of viewing individual pollutant source in isolation of other stressors
- Best addressed through the development of watershed plans
- Achieve greater environmental results

EPA Regulators Support Watershed Management

CSO Control Policy/LTCP Guidelines

- “evaluate water pollution control needs on a watershed management basis and coordinate CSO control efforts with other point and nonpoint source control activities”

CSO Challenges for Watershed Management

- Lack of comprehensive authority
 - Regulated & non-regulated sources
- Lack of comprehensive data
 - Nonpoint Source
 - High variability
- Future uncertainty
 - Population shift
 - Land use shift
 - Climate change
 - New technologies
 - New regulations
 - Changing costs

Evolution of Water Quality Protection

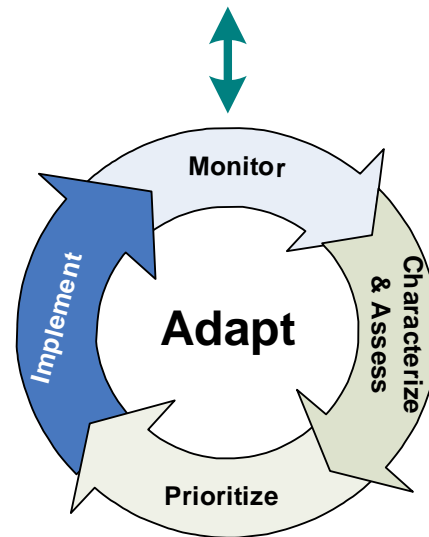
- Silo treatment requirements
- Watershed management
- Adaptive watershed management

Adaptive Watershed Management

Regulators

Public

GOALS



Adaptive Watershed Management

- Strengthen of Watershed Management (holistic, prioritize. . .)
- Progress in face of uncertainty
- “Learn” while “doing”
- Persistence not impatience or avoidance
- Cost effective

Examples of CWA use of Adaptive Management Approaches

1. 5 years cycle NPDES permits
2. Triennial WQ standards review
3. Biannual state 305(b) WQ assessment
4. 303(d) impaired waters: 2-5 years
5. Continuing planning process 303(e)
6. Etc.

Scientists and Regulators Promote Adaptive Management

- National Academy of Sciences
- EPA Watershed Management Handbook
- EPA Permit Writer's Manual

Scientists and Regulators Promote Adaptive Management

EPA coordinating CSO LTCP with WQ
Std Reviews, 2001.

- “EPA expects that communities will implement high priority controls while TMDLs or watershed plans are being completed. An iterative, phased implementation of CSO controls fits well with the watershed approach.”

Northern Kentucky Sanitation District 1

- Adaptive watershed management approach to CSO control
- Consent Decree
- “Work in Progress”

21st Century Approaches to Water Quality Protection

- Watershed Management
- Adaptive Management
- Reassessing WQ goals
 - *Use Attainability Analysis (UAA)*

Water Quality Standards Issues for CSO Impacted Waters

- Physical hazards
- High flow hazards
- High vs. low flow
- Non CSO pollution
- Assessing Risk
- Storm recurrence
- Irreversible changes
- Cost effectiveness
- Affordability
- Criteria

Recent Research & Support

EPA Guidance, 2001

- Coordinating CSO Long Term Planning with WQ Standards Reviews

NACWA/WERF, 2005

- Collaborative Water Quality Solutions: Exploring Use Attainability

WERF, Summer 2007

- Factors for Success in Developing Use Attainability Analyses

21st Century Tools Promote Better Approaches

- Advanced computer models
- Monitoring advances: e.g. source tracking
- Better answers / questions
 - Cause or contribute
 - Frequency, magnitude & duration
 - Cost benefit
 - Attainability

Comptroller General – GAO

December 1979

Large Construction Projects to correct CSOs are too costly

- More flexible water quality goals
- Encourage alternative approaches
- Promote Best Management Practices
- Integrate flood control & CSO control

*21st Century
Approaches to CSO &
Water Quality Restoration*

Paul L. Freedman, P.E., BCEE



734-332-1200 ■ pfreeman@limno.com